

A wavelength division multiplexed (WDM) optical network includes a plurality of optical transmitters, each optical transmitter generating a data signal sent over a respective one of a plurality of signal channels, the plurality of signal channels being divided into a number of sub-bands where each sub-band includes at least two signal channels, and a plurality of substitute signal transmitters, the number of substitute signal transmitters being equal to the number of sub-bands, each substitute signal transmitter generating a substitute signal which provides loading in a corresponding sub-band. The WDM optical network also includes a combining circuit which combines the data signals output from the plurality of optical transmitters and the substitute signals output from the plurality of substitute signal transmitters into a WDM signal, and an optical transmission fiber which receives the WDM signal from the combining circuit.